

Abstract of the DVSc thesis No 11741, Faculty of Veterinary Medicine, Urmia University

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Title of thesis: Comparative Analysis of Quantitative and Qualitative Sperm Indices, Testicular Histomorphometry, and Apoptosis-Related Gene Expression in Broiler Breeder Roosters of the Arian and Ross 308 Strains.

Abstract

Fertility plays a prominent role in broiler breeder production, and reduced semen quality in breeding roosters represents a significant challenge in broiler breeder farming. Given that the cultivation of the Arian breed has garnered attention in Iran to promote self-sufficiency in broiler chicken production, this study conducted a comparative analysis of sperm indices (count, viability, and motility) and testicular histomorphometry between the Arian breed and the Ross 308 strain (the most prevalent strain worldwide). In this investigation, sperm samples, testicular tissues, and apoptosis-related gene expression were evaluated in sixty roosters (30 Arian and 30 Ross 308) across three age groups (35, 45, and 55 weeks). The results indicated that, in terms of sperm indices, the sperm count in the Arian strain was non-significantly higher ($p > 0.05$) than in the Ross strain at 35, 45, and 55 weeks of age. Sperm viability was higher in the Ross strain at 35 weeks and in the Arian strain at 55 weeks, with minimal differences observed at 45 weeks. Sperm motility was superior in the Ross strain at 35 weeks and in the Arian strain at 45 and 55 weeks. Histomorphometric examination of testicular tissue revealed no significant differences between the strains in spermatogenesis indices, tubular differentiation, Sertoli cells, meiosis, or seminiferous tubule diameter. Real-time PCR results demonstrated elevated expression of the pro-apoptotic gene caspase-3 in the Ross strain and higher expression of the anti-apoptotic gene Bcl-2 in the Arian strain, which aligned with the sperm quality findings. This study revealed that sperm evaluation parameters in roosters of both strains exhibited a declining trend with advancing age, and overall, the fertility of Arian strain roosters demonstrated superior performance at older ages compared to the Ross 308 strain.

Key words: Broiler breeder rooster, Arian, Ross 308, sperm, testis, pro-apoptotic gene caspase-3 and anti-apoptotic gene Bcl-2, real-time PCR.